

Historical Extreme Events and What the Future May Hold

STAR: Storm Studies in the Arctic
Danielle Desjardins, M.Sc.
University of Manitoba

Objective

- Identify large scale and local factors that influences the storm tracks and severity of extreme weather events in the Canadian Arctic
- Identify the impacts that these factors will have on the intensity and the tracks of storms in the future

Tasks

- Establish a relationship between upper level flows and extreme weather events
- Identify patterns that may indicate an increase in severe weather events in the Canadian Arctic for the future
 - Extreme events in both cold and warm seasons
 - Solid and liquid precipitation, severe wind events

What Has Been Done?

- Variations of cyclonic activity in the Canadian Arctic (Chang and Fu 2002)
 - Strengthening trend
- Storms over Baffin Island during Autumn 2005 (Roberts et al 2007)
- Freezing rain events (Hanesiak and Wang, 2005)
 - More frequent
- Major cold season precipitation events (Gascon 2008)
- Major wind events (Nadeau 2007)

What Has Been Done?

- Climatological tracking of storms in the Canadian arctic - especially over Iqualuit
 - Three major storm tracks
 - South - originating from the United States or the Great Lakes tracking northward
 - West - originating from the North West Territories, caused by lee cyclogenesis
 - Atlantic - originates over the Atlantic ocean and begins to decay over Cumberland sound

My Thesis

- Looking at a more specific area of the Canadian arctic
- Air flows at all levels
- Correlating with regional climate models
- Hypotheses
 - Changes in climate may affect severe conditions and may change the overall storm tracks in the Canadian Arctic
 - Warm season may extend beyond what is presently seen
 - Increases in open water will intensify severe events

Case Studies

- STAR Data collection period
 - Severe storm from November 5, 2007
- Pangiirtung severe rain event
 - June 2008
- Hurricane Noel
 - October and November 2007
- Extreme rain and wind event (Gascon, 2008 and Nadeau, 2007)
 - December 4, 1982
- Other extreme events...



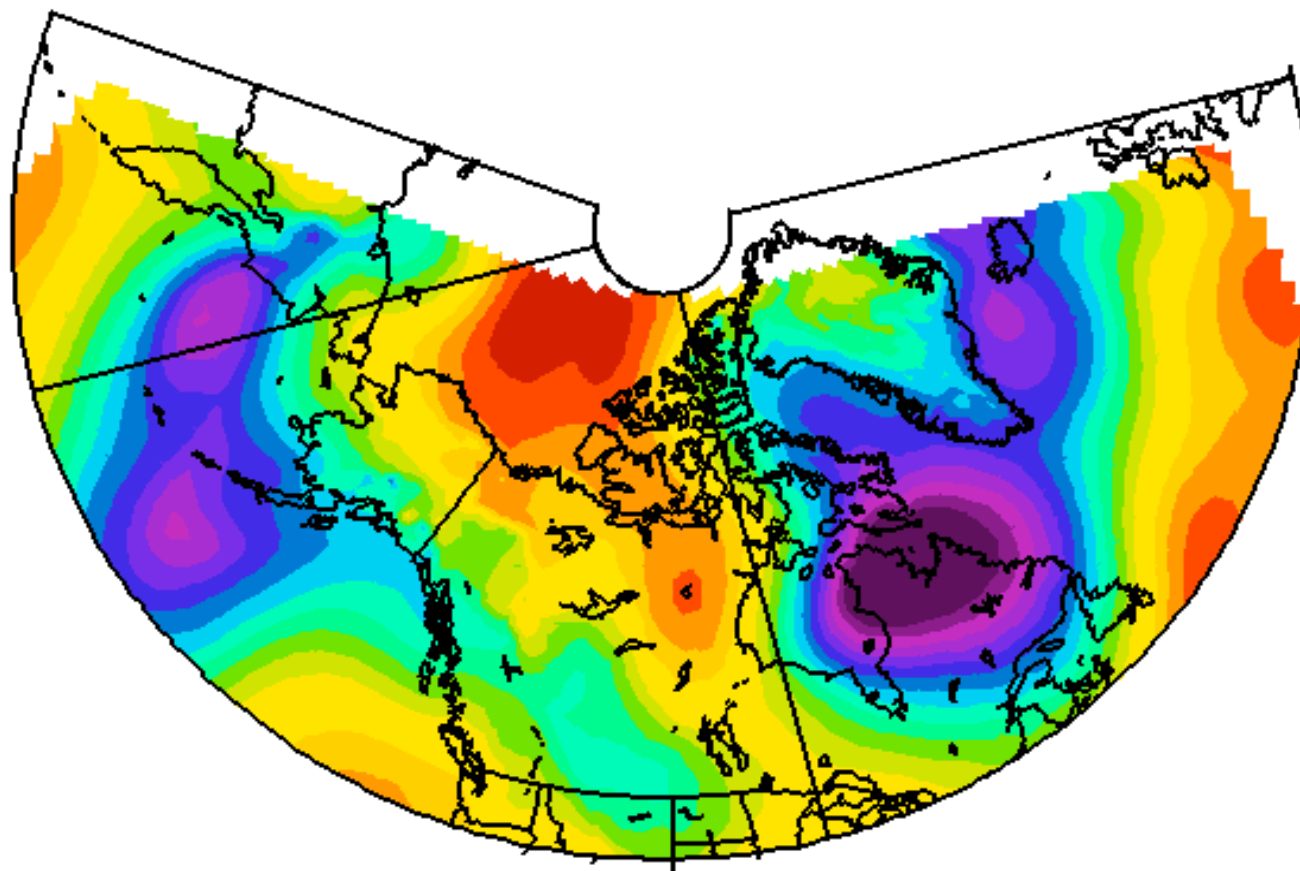


Data

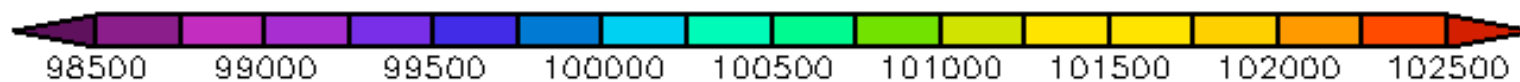
- North American Regional Reanalysis (NARR) data
 - Used to reanalyze atmospheric data during extreme events
- STAR data
- Intergovernmental Panel on Climate Change scenarios

Pressure at Mean Sea Level (Pa) Composite Mean

NOAA/ESRL Physical Sciences Division

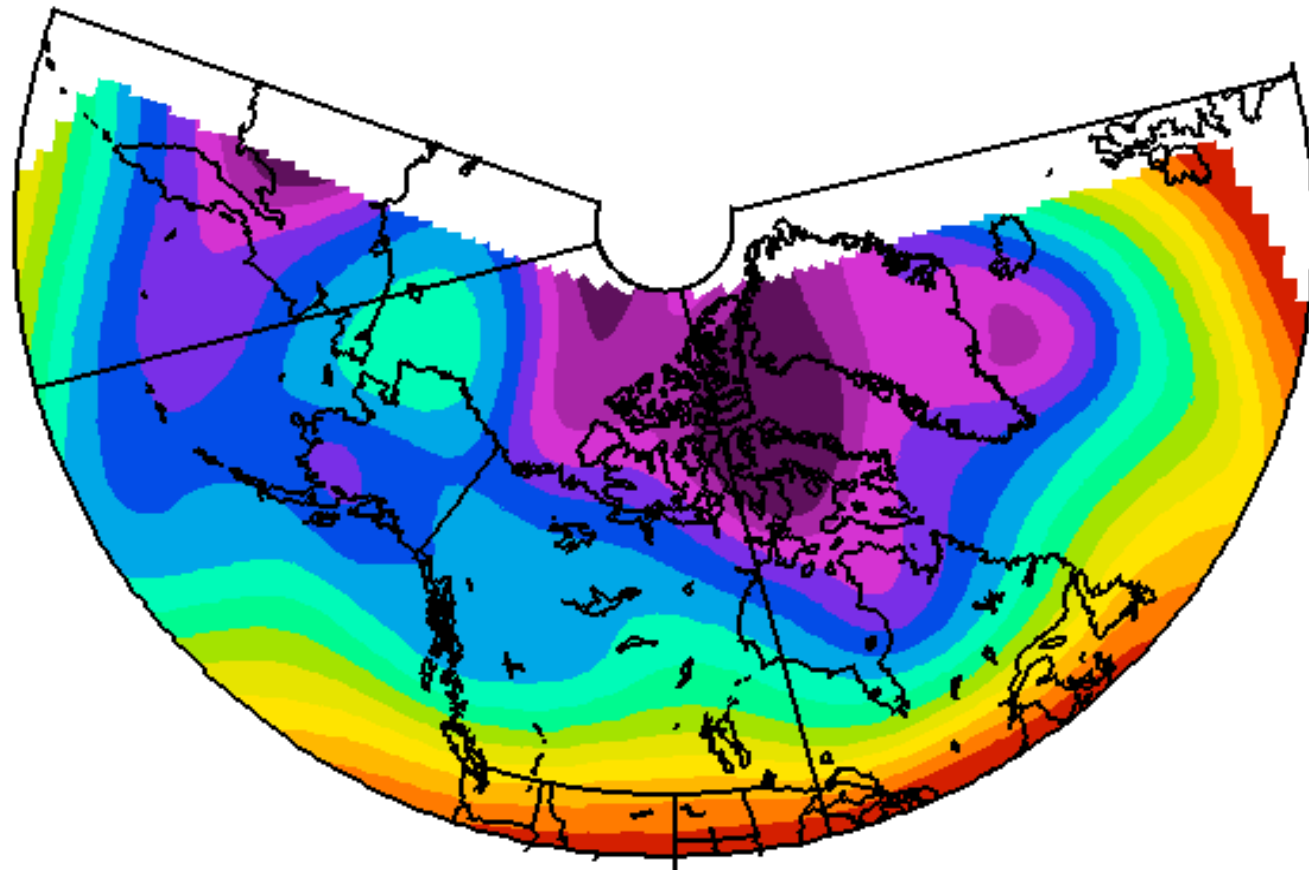


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NCEP North American Regional Reanalysis
500mb Geopotential Height (m) Composite Mean

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Suggestions?

- Other extreme events?
- Other data/approaches?